TWO DISTINCT MANTLE SOURCES OF HERCYNIAN MAGMAS INTRUDING THE MOLDANUBIAN UNIT, BOHEMIAN MASSIF, CZECH REPUBLIC

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The petrogenesis of ultrapotassic plutonic rocks of the durbachite suite that intrude the Moldanubian unit has been a matter of debate. New integrated geochemical and Sr–Nd isotopic data for these rocks, whose intrusion *ca.* 345 Ma ago closely post-dated tectonic emplacement of the Gföhl nappe, contribute to understanding their petrogenesis. Isotopic data for melagranites and quartz melasyenites from the Central Bohemian Plutonic Complex (CBPC) and the Třebíč massif are relatively uniform, with the total range of $(^{87}Sr/^{86}Sr)_{345}$ = 0.7107–0.7122 and ε^{345}_{Nd} -6.1 to -6.5. These values are comparable to published data for the Sedlčany granite of the CBPC (which is chemically related to the durbachites) and minettes that cut this complex. However, they are very different from those for relatively primitive, K-poor gabbroic and tonalitic magmas of the Sázava suite of the CBPC. The latter, interpreted as having been generated from a mantle reservoir with a Sr–Nd isotopic composition similar to, or more depleted, than the Bulk Earth were intruded only *ca.* 5–10 Ma before the ultrapotassic rocks.

The evolved Sr–Nd isotopic character of the durbachites, together with their high *mg#*, K_2O/Na_2O, Rb/Sr, and high contents of Cr, Ni, Rb, Cs, U and Th, cannot be explained by either partial melting of known crustal lithologies or crustal contamination of more depleted basic magmas, that were isotopically similar to those of the Sázava suite. Rather, a lithospheric mantle source with a complex history of depletion and re-enrichment by hydrous, K-rich, LILE- and LREE-bearing fluids is required. The presence of such a reservoir beneath the Moldanubian unit was recently given support by detailed studies of garnet pyroxenites (from Bohemia and Lower Austria), that were interpreted as high-pressure cumulates crystallized *en route* from carbonatite, melilitite or lamphrophyre magmas. From the available geochronological evidence it is apparent that they were partly contemporaneous with the durbachites, and also the Sr–Nd isotopic data for both rock groups overlap. As in the case of the durbachites, the trace-element and isotopic composition of the pyroxenites was interpreted as reflecting a lithospheric mantle source with anomalously high contents of LILE and LREE.

Enrichment in the mantle source of the ultrapotassic rocks could have been caused by influx of hydrous fluids from a subducted slab with the metasomatized mantle wedge becoming an integral part of the local lithospheric mantle. On the basis of modelling, the subduction stage is considered to have significantly pre-dated the generation of K-rich durbachitic magma. Direct mixing of a relatively primitive local mantle with a subducted pre-Hercynian metasedimentary component could also have occurred.

It is possible that the first, more primitive basic melts in the CBPC (Sázava suite) came from a relatively undepleted (asthenospheric?) mantle source, whose upwelling (possibly in response to extension and lithospheric delamination) caused heating of the overlying lithospheric mantle. The resultant rise of isotherms would trigger both small-scale partial melting of the lithospheric mantle and the gradual advancement of the melting zone upwards, and lead to contamination during the ascent of the asthenospheric melt, to produce the progressively more enriched magmas. If the lithospheric mantle were geochemically and isotopically heterogeneous, then the more enriched zones have been tapped by the later magmatism, or the more enriched magmas represent lower degrees of partial melting containing the more fusible metasomatic components. The occurrence of ultrapotassic rocks exclusively within the Moldanubian unit could be consistent with its underlying lithospheric mantle being essentially different from that beneath the juxtaposed Teplá–Barrandian unit.